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Missouri Petroleum Storage Tank Insurance Fund
Review of Liabilities and Loss Projections
as of June 30, 2011

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Performed by: Kerper and Bowron LLC

1. Executive Summary

This report makes an actuarial estimate of liabilities at June 30, 2011 of 108,590K for the Missouri Petroleum Storage Tank Insurance Fund. Details of the operation of the fund are noted in Section 4. This would include 58,647K of case reserves and a point estimate of IBNR of 49,943K. With the fund balance at June 30, 2010 at 76,528K, the fund would need an estimated additional 32,062K to close all remaining loss liabilities. This amount does not include settlement expenses.

Projections were also made on the projected equity and a fiscal year cash flow basis from 2012 until 2021. Projections include anticipated revenue from transport load fees and expected expenses and claims payments. Claims payments are projected for both existing claims and new claims reported in the future.

The variance of these forecasts in the outlying years was analyzed and found to be large. This is due to the high amount of loss development on this program, and uncertainty in the future years on the frequency, severity and payout pattern of the fund. We took the additional step of modeling this uncertainty to construct a range around the possible outcomes.

Our simulations show that the range of possible outcomes increases the further into the future we perform projections of fund balances and fund equity:

- The fund balance in 2021 is projected to be approximately $30 million.
- We would expect that the fund would have a positive cash balance in 2021, but there is a 5% chance that the fund would have a balance of less than $2.3 million.
- In 2016, there is an 80% chance that the fund balance will be between $32 million and $49 million.
- We estimate that the cash balance will decrease each year about $4 million dollars on average over the next 10 years.
- Negative equity in the fund (the excess of liabilities over assets) is currently $32 million. We project equity will remain fairly constant over the next decade.
- In 2016, there is an 80% chance that the equity in the fund will be between -$49 million and -$13 million.
- There is about a 10% chance the fund will be solvent by 2021 (assets greater than liabilities).

2. Purpose of Study

The purpose of this study is to review the reserves and loss projections for the Missouri Petroleum Storage Tank Insurance Fund. The fund's Board of Trustees contracted with Kerper and Bowron LLC to perform this review. Loss projections have been made for the years 2012 through 2021.

Actuarial data and guidance for this study were provided by both the Board's staff and Williams and Company (the third-party administrator of this program).

3. Limitations

Actuarial projections rely on extrapolating past trends to make assumptions about future development and emergence of claims. Since these claims are subject to significant random deviations as well as changes in the legal and regulatory climate, it is possible that the actual results may differ significantly from the projections that have been made.

Consistency - The conclusions are predicated on the assumptions that the selected reporting, reserving, and payment patterns, frequency and severity trends, and claim distributions apply, and will continue to apply, to the program. The risk exposure covered by the program as well as the claim management and settlement practices are assumed to be consistent over time, except as noted.

Entire Document - The study conclusions are developed in the accompanying text and exhibits, which together comprise the report.

Data Reliance - the PSTIF Board of Trustee's staff and Williams and Company provided the data for this study. In the study, we relied on the accuracy and completeness of this data without independent audit. If the data is inaccurate or incomplete, our findings and conclusions may need to be revised.

Management Reliance - the PSTIF Board of Trustee's staff and Williams and Company provided information concerning the program structure and risk exposure. In the study, we relied on the accuracy and completeness of this information without independent verification. If the information is inaccurate or incomplete, our findings and conclusions may need to be revised.

Underlying Assumptions - In addition to the assumptions stated in the report, numerous other assumptions underlie the calculations and results presented herein.

Study Foundations - The study conclusions were based on analysis of the available data and on the estimation of many contingent events. Future costs were developed from the historical claim experience and covered exposure, with adjustments for anticipated changes.

Significant Digits - Numbers in the exhibits are generally shown to more significant digits than their accuracy suggests. This has been done to simplify review of the calculations.

Interpretation of Conclusions - Some of the assumptions, methods, and conclusions in this report are of a significantly technical nature. The recipient should understand the assumptions, methodology and possible variability in results that are inherent in our conclusions. We are available to discuss our assumptions, methodology and conclusions in greater detail.

Assets - We have assumed that valid assets, which have appropriate maturities and sufficient liquidity to meet the cash flow requirements of the Missouri Petroleum Storage Tank Insurance Fund, support the reserves. We make no guarantee that Missouri Petroleum Storage Tank Insurance Fund funds will prove sufficient.

Uncertainty - Due to the uncertainties inherent in the estimation of future costs, it cannot be guaranteed that the estimates set forth in the report will not prove to be inadequate or excessive and actual costs may vary significantly from our estimates.

Unanticipated Changes - Unanticipated changes in factors such as judicial decisions, legislative actions, claim consciousness, claim management, claim settlement practices, and economic conditions may significantly alter the conclusions.

Best Estimate - These caveats and limitations notwithstanding, the conclusions represent our best estimate of the actuarial status and funding requirements of the program as of the date of this report.

4. Terms used in Study

IBNR. IBNR stands for claims Incurred But Not Reported. This is the estimated additional amount needed to close all claims currently reported to the fund.

Loss. The use of the term loss without modification includes loss and legal costs but does not include unallocated loss adjustment expense (ULAE).

ULAE. Unallocated Loss Adjustment Expenses. These are claims settlement expenses. There is no provision in the IBNR for claims settlement provisions. However, the cash flow projections include a provision for these.

Case Reserves. These are loss reserves set for individual claims by the adjuster.

Indicated Loss Reserve. This is IBNR + Case Reserves. This is the estimated total amount to close all claims at June 30, 2011.

Cash Flow Projection. This is the projected increase or decrease in cash flow during a calendar year. It is the difference between the projected revenue and the projected losses and expenses.

Severity. This is the average amount either observed or expected for a claim which will ultimately close with pay. Claims closing without payment (which are a high percentage of claims in the fund) are not counted in this calculation.

Frequency. This is the number of claims either observed or expected which are expected to ultimately close with a payment.

5. Background Information (This has been provided by the Missouri Petroleum Tank Insurance Fund)

Notable Events in the Fund's History

The Petroleum Storage Tank Insurance Fund was established by the Missouri Legislature in 1989, (at the time, it was called the "Underground Storage Tank Insurance Fund"). It was originally housed in the Office of Administration. In 1991, the Missouri General Assembly substantially amended the law governing the Petroleum Storage Tank Insurance Fund. A new revenue mechanism - the "transport load fee" - was established, and responsibility for managing and operating the Petroleum Storage Tank Insurance Fund was transferred to the Department of Natural Resources. Petroleum distributors, licensed by the Department of Revenue, paid the transport load fee. It was a "self-reported fee" paid monthly by these distributors and collected by the Department of Revenue for deposit into the Petroleum Storage Tank Insurance Fund. Collection of the fee began on October 1, 1991.

In 1992, after receiving a report and recommendations from Milliman & Robertson, Inc., the Department of Natural Resources engaged an outside contractor to provide third-party administration services (currently Williams and Company) and began operation of the Petroleum Storage Tank Insurance Fund.

In 1992, the Petroleum Storage Tank Insurance Fund had a single purpose: to insure owners and operators of underground storage tanks which contained petroleum for risks associated with cleanup of spills and leaks, and third-party damages which might result from such spills or leaks.

The first insurance policies were issued by the Department of Natural Resources' third-party administrator in May 1992. "Participation fees" were collected and deposited into the Petroleum Storage Tank Insurance Fund by the third party administrator.

The first claims were filed later in 1992, and the first claim payment was made in June 1993.

The 1996 legislation further expanded the Petroleum Storage Tank Insurance Fund by extending the same two purposes for certain aboveground storage tanks (ASTs). AST owners whose tanks were in service could now apply for and receive insurance coverage, and sites where ASTs were out of use by December 31, 1997 could receive benefits for cleanup, if the site was reported to the Department of Natural Resources by that date.

The 1996 legislation, known as Senate Bill 708 (SB708), also established a board of trustees to manage the Petroleum Storage Tank Insurance Fund, effectively moving administration and responsibilities from the Department of Natural Resources to the board of trustees. The board of trustees took over management of the third party administrator contract, employed an Executive Director, and has managed the Petroleum Storage Tank Insurance Fund since.

In 1998, the Legislature significantly changed the way various fees and taxes on petroleum are collected. As part of House Bill 619, the point of payment of the Petroleum Storage Tank Insurance Fund transport load fee was transferred from the petroleum distributor to the petroleum supplier, resulting in fewer payers.

In 2001, the state legislature again amended the law, extending the "sunset date" of the program to December 31, 2010. The legislation (HB453) also gave the Petroleum Storage Tank Insurance Fund board of trustees the authority to raise the transport load fee to a maximum of \$60.00, with no annual increase in excess of \$15.00. The Board subsequently raised the fee from \$25 to \$40 per 8,000 gallons.

In May 2002, the PSTIF began offering an extended reporting period to AST owners/operators who sold their tanks or took them out of service. In May 2004, the PSTIF began offering this same option to underground storage tank owners. Owners may purchase the extended reporting period annually for a period of up to five (5) years after their tanks are sold or closed. Of the 913 PSTIF participants to whom this offer has been made, 449 purchased the extended reporting period for at least one (1) year. Currently there are 373 such endorsements in effect.

Experience indicates that the majority of covered leaks relate to fittings and joints on pipes. It is less frequent that situated tanks themselves experience failure.

In 2008, the state legislature enacted Senate Bill 907, which – among other things – extended the PSTIF's "sunset date" to December 31, 2020.

In July 2008 the Board of Trustees lowered the "transport load fee" from \$40 per 8,000 gallons to \$20 per 8,000 gallons. This fee was effective with revenue received in November 2008.

In 2008, the Legislature mandated that by December 31, 2010, aboveground storage tank owners must have a "financial responsibility mechanism" in place. This has increased the number of AST exposures to the fund.

Operation of the Fund

Claims filed by persons who are or were insured at the time the contamination was discovered are called "insurance claims". Many of the insurance claims involve cleanup of historical contamination released into the environment during a lengthy period of operation of the storage tanks, including operation prior to implementation of today's environmental standards.

The insurance protection provided by the Petroleum Storage Tank Insurance Fund to active tank owners includes coverage for up to \$1 million per occurrence, \$2 million annual aggregate, for costs of cleanup, third-party property damage, and third-party bodily injury. There is a deductible of \$10,000 per occurrence.

Claims filed to clean up a "pre-existing" leak/spill at an insured site, or an "out-of-use" tank site, are called "remedial claims."

For "remedial claims," the Petroleum Storage Tank Insurance Fund pays up to \$1 million for cleanup costs per site; there is no coverage for third-party property damage or third-party bodily injury. The person doing the cleanup must pay the first \$10,000 of cleanup costs.

A claim reserve is established for each instance where a release is confirmed and the site is eligible to receive benefits from the Petroleum Storage Tank Insurance Fund. The claim reserves are adjusted on an ongoing basis as more information about the site, the extent of contamination, and the planned cleanup is available. No claim reserve for future claims is currently maintained.

All claim files of the Petroleum Storage Tank Insurance Fund are maintained at offices located in Jefferson City, MO.

A balance sheet and income statement are prepared monthly, using information provided by the State Accounting System and data maintained by the Petroleum Storage Tank Insurance Fund board of trustees' third party administrator under the provisions of its contract.

The board of trustees' third-party administrator provides services in the following four areas:

- Underwriting, including the receipt and review of initial insurance applications and annual insurance renewal applications. This process includes a compliance review of the facility's operating records, including review of leak detection records, maintenance documents, logs of cathodic protection system readings, etc.

- Claims management, including the receipt of notices of claims, claims investigation and adjusting services, eligibility determinations, receipt and review of cost estimates from owners and/or their consultants for characterizing and

cleaning up contamination, review of invoices, and preparation of payment recommendations.

- Record-keeping and other administrative services, including design and maintenance of software for maintaining official records of the Petroleum Storage Tank Insurance Fund, maintenance of the Petroleum Storage Tank Insurance Fund web site, receipt of and response to public inquiries, technical assistance to tank owners, and other support services for the Executive Director and the board of trustees.

The Attorney General's Office (AGO) annually receives approval from the board of trustees for an appropriation from the Petroleum Storage Tank Insurance Fund to support one-half an FTE. This person provides legal advice and counsel to the board of trustees and the Executive Director.

The board of trustees has also engaged outside counsel to defend insured tank owners/operators when a third-party claimant files litigation against the tank owner/operator.

The Department of Revenue annually receives approval from the board of trustees for an appropriation from the Petroleum Storage Tank Insurance Fund to pay for its services collecting the transport load fee.

The Department of Natural Resources annually receives approval from the board of trustees for an appropriation from the Petroleum Storage Tank Insurance Fund to support its regulatory activities. This is an ongoing administrative expense.

Today, PSTIF insures 7,168 underground storage tanks at 2,618 sites. It also insures 2,845 aboveground storage tanks at 845 sites.

Prior actuarial studies have been completed on the fund. These include:

- A review of the Petroleum Storage Tank Insurance Fund operations and an actuarial study performed by Milliman & Robertson in 1996.
- An actuarial study performed by Matthews Actuarial LLC in 2003.
- An actuarial study performed by Pinnacle Actuarial in 2005.
- An actuarial study performed by Kerper and Bowron LLC in 2007.
- An actuarial study performed by Kerper and Bowron LLC in 2009.

6. Impact of "Risk Based Guidance" on Actuarial Results (Exhibit VII)

As part of this analysis, we have analyzed the impact of "Risk Based Guidance" standards introduced in 2004.

Because RBCA coding is limited to closed claims, there are some limitations to this analysis. Also, there are many closed claims in the database which were settled partially under pre-RBCA standards and partially after RBCA standards were introduced.

The process to analyze this difference is described below:

First, all the closed claims were divided into RBCA/Non-RBCA categories.

Second, only claims which either opened prior to 1/1/2004 as Non-RBCA or later than 1/1/2004 as RBCA were considered.

Third, any claims closing on the Non-RBCA standard which were closed after 8 years were eliminated since those types of claims are not represented in the RBCA claims.

These eliminated claims (which are generally high cost claims) cannot be compared to the other claims. The Claim Age in the Exhibit VII is the time from the opening of the claim to the closing of the claim.

Fourth, severities were adjusted from the transaction date until June 30, 2011 using 2% inflation.

Adjusted for inflation, it looks like the RBCA claims are settling about 15 percent lower than similar Non-RBCA claims. The reason that the Non-RBCA claims are trended more is that they are, in general, older. Unadjusted for inflation, they are about the same.

There was no adjustment for the mix of claims.

While it appears that the RBCA standards introduced in 2004 may have had a positive impact on the severity of closed claims, there are insufficient data to allow for any conclusion on how costs of cleanup under the 2004 standards will ultimately compare with costs incurred under the previous standards. Many costs are incurred many years after the claim has occurred. A crucial consideration is whether claims will close faster or slower under the RBCA standards. This is not clear from the data.

7. Actuarial Methodology

Data

Loss data was developed from a transactional pull from the PSTIF's claims system. Loss data was from inception until June 30, 2011. Data was analyzed on a fiscal year basis. Revenue was generated from reports provided by the PSTIF. These exhibits showed the transport load fees, initial tank fees, and annual participation fees.

Data was segregated into the type of claim (Insurance/Remedial) and the type tank system (AST/UST). In addition, it was discovered that development patterns for insured UST tanks differed by the cause of loss. For the purposes of this report UST Insurance

claims were divided into 3 separate subcategories: Closure, Release, and Sale/Other. Claims which were the result of a "Sale" appear to develop much slower than other types of claims.

Claim type was not credible for AST claims or remedial claims. Therefore, there are no breakouts for these types of claims.

Summarizing the above classifications, data was analyzed for the following 6 categories:

1. Insurance UST-Release
2. Insurance UST-Other
3. Insurance UST-Closure
4. Insurance AST claims
5. Remedial UST claims
6. Remedial AST claims

For all claims, the data was organized on a "report year" basis. In the database, the occurrence date was ignored and the reported date was used. In all cases, dates have been converted to a fiscal year basis (July 1 – June 30) and so claim that occurred and was reported on July 1, 2005 would be a fiscal year 2006 claim.

Projection Methods

Development of Ultimate Losses for 1993 - 2011

Each of these categories was analyzed for past patterns of loss development. Because of the volatility of these claims, loss development was often not consistent. Loss development was not credible for the later periods, and significant judgment was utilized in selecting loss development for later periods, especially for paid losses.

These losses are developed in Exhibit III. All 6 categories utilized the first two methods, while only the insurance claims were appropriate for the Bornhuetter-Ferguson method.

"Reported Loss Development" – Paid losses and case reserves (reported losses) are grouped by age and projected to ultimate

"Paid Loss Development" – Paid losses are grouped by age and projected to ultimate

"Reported Bornhuetter-Ferguson Method" - This method applies reported loss development to the "expected losses" for a given year.

In this case, expected losses were derived from the participation fees for UST and AST insurance. In these cases, the ratio of claims to the fees will not be meaningful except in establishing a baseline ratio for expected claims.

"Paid Bornhuetter-Ferguson Method" - This method applies paid loss development to the "expected losses" for a given year.

"Frequency/Severity Method"– This method combines ultimate frequency and severity together. This method was used to project report year losses from 2010 – 2019.

Ultimate losses were selected from the Reported Method.

Development of Ultimate Losses for 2012 – 2021

Ultimate losses for 2012 through 2021 were made from an estimate of the future frequency and severity for the fund. These were largely based on projections from the past 5 years. In general, severities have been flat and frequency has been declining over this period (though frequency has been fairly flat in the past couple of years).

2012 Claims Assumptions

	Frequency	Severity
USTINS RELEASE	7.0	186,550
USTINS OTHER	10.6	91,597
USTINS CLOSURE	21.5	117,041
USTREM	11.9	73,567
ASTINS	3.2	131,739
ASTREM	0.7	82,318

The claims and severities represent claims that will close with payment.

Future frequencies (2013 – 2021) were assumed to be stable except for AST Insurance, which due to the change in financial responsibility, will likely see an increase in claims frequencies. In addition, severities are projected to increase by 0.5% per year.

Because the payment patterns for these claims are so long, estimates for future ultimate claims in the out years (such as after 2016) will have minimal impact on the ten year projection.

Development of Cash Flow Projections

The ultimate loss estimate for each report year is used to project the calendar year payment for future years. This is based on the historical payment pattern for the past 19 years. After 19 years, it is assumed that the remaining payments will be made over 6 years with equal payments in each year.

However, for Remedial UST claims the pattern was extended since these claims are so old and it is probably unrealistic for all of them to close over the next several years.

In addition, a projected subrogation amount of 0.4% of all paid claims was used.

Sunset of Fund

The fund sunset date of December 21, 2020 was ignored for this analysis. It is likely that any sunset of the fund would cause a "claims surge" as policyholders made claims prior to the cut off of funding.

Current Case Reserving

A review of average reserves on open claims by type and age does not reveal any major trends in case reserve adequacy.

It is not recommended that any major changes occur to case reserving methodology unless external circumstances dictate. This is due to the adequacy of current reserving, as well as the impact that reserving changes would have on future actuarial analysis.

Projected Ultimate Liabilities as of June 30, 2011

As noted above, this report makes an actuarial estimate of liabilities at June 30, 2011 of 108,590K for the Fund. This includes 58,647K of case reserves and 49,943K of IBNR.

Projected Fiscal Year Results

Balance sheet and income statements were projected through 2021. It was decided to only project losses through 2021 since projections beyond this date are highly subjective.

In general, the Williams and Company projections were used as a basis for these projections for the revenue and expense items. However some minor changes were made to the Williams and Company numbers.

Losses were derived from the ultimate loss selections as well as the frequency and severity of new claims in the years 2010 through 2021. These claims are paid out according to the selected payout pattern that is based on historical data.

Investment Income

Assets held by the fund are invested by the State of Missouri in a variety of short term highly liquid assets such as US Treasuries. The average length to maturity for the fund's assets is slightly over 1 year. For this reason, the fund's investments are subject to the direction of short term interest rates. Recently, those investments have been earning less than 1% annually, but historically the rate has been higher. Our projection assumes a mild increase in investment income over the next 10 years.

8. Issues specific to this RFP

Large Claims (above $250,000)

Information concerning large claims is included in Exhibit VI.

While large claims represent a substantial portion of the payments from this fund (similar to many insurance ventures), it is difficult to segregate and analyze these claims in a meaningful way.

This is because most large claims began as small claims and develop to larger claims over time. We've included some statistics as to the amount of large claims and the historical amount of large claims by report year. Not surprisingly the percentage of large claims increases for older report years. Approximately 50% of all claim payments are expected to be for designated large claims once all the claims close.

Extending reporting provisions

Extended reporting provisions represent a small exposure base for the fund, with approximately 213 in force with an average premium of $348. There is no discount offered for the extended reporting provision, the endorsement is offered at the same rate as the existing business.

There have been a number of claims associated with extended reporting provisions. In some cases, it appears that extended reporting provisions are obtained by tank owners when they sell the property. The claims are then reported under the extended reporting provision, often within a short time frame from the sale.

Extended Reporting endorsements are currently about 6% of participation fees but 14% of losses.

9. Comparison with Prior Actuarial Reports

For the estimate of ultimate liabilities of the fund, case reserves have declined by 9 million since the last report while IBNR is basically flat.

Equity estimates are significantly higher than the last report as the frequency and severity of new claims continues to decline. The 2009 report estimated that ultimate losses from the 2010 and 2011 fiscal years would be 9.7 million per year, while the current estimate for these years is 5.1 million. 2012 is estimated at 6.8 million with increases in out years for increased severity as well as additional claims for AST releases.

Forecasting future equity is highly uncertain since it will be dependent on the future frequency and severity of claims which is subject to rapid change due to changing environmental concerns, inflation, real estate transactions, and a host of other factors.

Nevertheless, it is clear that the fund currently enjoys a new claims frequency and severity rate which is significantly below the revenues of the fund.

The prior actuarial report predicted a mean estimate of 75.9 million for the fund at June 30, 2011 versus an actual balance of 76.5 million.

Cash projections for years 2012 to 2019 are slightly below the mean estimate from the 2009 report. Lower claims values are offset by lower expected revenue from the transport load fee due to expected flat petroleum usage. In addition, short term interest rates are at a historically low level. While some increase is expected in interest rates, lower rates are forecast for the later years as well.

10. Simulations

Actuarial modeling is a catchall phrase that usually means any type of activity where you use a large volume of historic data to create a representation of a business situation so you can analyze it. Your representation, or model, can be used to examine the situation, and help you understand what the future might bring.

Our analysis builds a model using a technique called "stochastic simulation" (also known as "Monte Carlo Simulation") to combine all the uncertainties in the model. Unlike traditional models, this technique does not force us reduce what we know about an uncertain future event (e.g. inflation, interment sales, etc.) to a single number. Instead, we include all we know about the variable, including its full range of possible values and some measure of likelihood of occurrence for each possible value. We use all this information to analyze every possible outcome. This model simulates 100 year-end balance sheets.

We apply this model to several "input scenarios" and catalog the results of the model. The details of each input scenario are described in *Input Scenarios Used* later in this Section.

Each application of the model is run 5,000 times; it's as if we ran 5,000 "what-if" scenarios all at once. In effect, it's as if you could "live" through your situation over and over again, each time under a different set of conditions, with a different set of results occurring. All this added information sounds like it might complicate your decisions, but in fact, one of simulation's greatest strengths is its power of communication. Our analysis gives you results that graphically illustrate the risks you face. This graphical presentation is easily understood by you, and easily explained to others.

There are some limitations however to an analysis such as this. While we can model the statistical uncertainty in our calculations we are unable to model all the variance associated with the future finances of the fund. This is due to the potential for an external event, such as an inflationary shock or a judicial decision that does not exist in our

historical database. Therefore the actual ranges of results for the fund are likely more variable than this analysis suggests. Nevertheless this remains a good tool for planning.

Description of Actuarial Model

The actuarial model shown in the exhibits included with this report is considered the most likely, "average" outcome. Our model calculated fund balances and projected equity under 5,000 different claim payment scenarios, each scenario being equally likely as the prior. The results from each individual scenario are not shown, but rather summarized in the simulation graphs and tables in this report.

The most uncertain component affecting our projections of future PSTIF fund balances are our projections of ultimate claim payments for each individual report year, and the dollar amount of claim payment occurring in each specific calendar year. These are the values we simulated. The process of using simulations to understand the range of likely outcomes is called a stochastic analysis.

Specifically, the payment in each calendar year between 2012 and 2021 emanating from report years 1993 to 2011 were separately simulated for the six types of claims in the study.

Based on the simulated claim payments in each scenario, the year-end fund balances and projected equity for 2012 to 2021 were recorded. We then re-simulated claim payments for our next scenario, and again recorded, the year-end fund balances and projected equity for 2012 to 2021. This process was repeated 5,000 times.

Technical Description of Simulation Distributions

In order to simulate the claim payments, a statistical distribution must be chosen in order to reasonably reflect the range of possible results. For the purposes of this study, we chose the lognormal distribution as the distribution type for the claim payments.

- For each simulated payment amount we used a separate gamma distribution with separate parameters. The gamma distribution is widely accepted as a representative distribution of financial information.
- For future frequency of claims we used a Poisson distribution.
- For the future severity of claims we used a lognormal distribution.
- For the trends to severity and frequency, we used a triangular distribution.

DISCUSSION OF RESULTS

We produced 10 histograms and one distribution summary graph for each projection.

Our simulations show that the range of possible outcomes increases the further into the future we perform projections of fund balances and projected equity.

Notes on Projection

- The fund balance in 2021 is projected to be approximately $30 million.
- We would expect that the fund would have a positive cash balance in 2021, but there is a 5% chance that the fund would have a balance of less than $2.3 million.
- In 2016, there is an 80% chance that the fund balance will be between $32 million and $49 million.
- We estimate that the cash balance will decrease each year about $4 million dollars on average over the next 10 years.
- Negative equity in the fund (the excess of liabilities over assets) is currently $32 million. We project equity will remain fairly constant over the next decade.
- In 2016, there is an 80% chance that the equity in the fund will be between -$49 million and -$13 million.
- There is about a 10% chance the fund will be solvent by 2021 (assets greater than liabilities).

GLOSSARY OF TECHNICAL TERMS

Histogram – A histogram is made from several rectangles plotted on the graph. The left and right position of each rectangle represents a range of possible results (e.g. a rectangle that spreads from $10 million to $20 million represents all scenarios that had an output between $10 million and $20 million). The height of each rectangle represents the percentage of scenarios with that result. The higher the rectangle, the more likely the result will occur.

Monte Carlo Simulation -- A mathematical simulation of future results where unknown values are selected randomly based on their probability distribution and correlation. Typically, hundreds, or even thousands of simulations are produced through computer analysis. A professional must then compile and analyze the results in order to determine reasonable conclusions. A series of Monte Carlo simulations can provide conclusions such as "There is a 5% chance that revenues will be less than $500,000", or "If the product launch in Denver is successful, there is still a 2% chance that revenues will be less than $500,000."

Statistical Distribution -- A mathematical formula indicating the likelihood of a random number taking on a specific value.

Stochastic Analysis -- A type of statistical analysis that relies on the use of statistical distributions of unknown variables rather than "best estimates" of those unknown variables. A stochastic analysis usually relies on Monte Carlo simulations.

MISSOURI PETROLEUM STORAGE TANK INSURANCE FUND
All Programs
000s

ALL LINES
SELECTED ULTIMATE LOSSES

Report Quarter	Total Revenue	Paid To Date	Case Reserves	INDICATED ULTIMATE LOSS Rep Dev	Rep BF	Paid Dev	Paid BF	Selected Ultimate Losses	Gross IBNR
1993	0	97	(0)	109	109	116	116	109	12
1994	0	3,187	567	4,149	4,149	3,569	3,569	4,062	307
1995	0	3,834	330	4,622	4,622	4,432	4,432	4,576	411
1996	0	56,795	10,910	73,686	73,686	65,752	65,752	71,810	4,104
1997	0	16,409	1,906	20,817	20,817	20,351	20,351	20,817	2,502
1998	1,492	23,155	2,835	29,907	29,967	29,721	29,908	29,907	3,916
1999	1,251	19,975	4,261	28,910	27,424	26,760	25,208	28,910	4,674
2000	1,160	23,344	6,438	35,723	34,707	33,658	31,485	35,723	5,942
2001	1,162	9,139	4,451	15,774	16,124	14,056	12,911	15,774	2,184
2002	1,225	10,154	3,639	17,079	16,264	16,181	14,462	17,079	3,286
2003	1,225	6,881	2,972	12,724	12,245	11,940	10,889	12,724	2,871
2004	1,252	8,488	2,839	14,956	14,281	16,591	14,015	14,956	3,628
2005	1,285	5,957	3,239	12,115	12,127	12,334	11,815	12,115	2,918
2006	1,297	3,198	2,077	7,412	8,038	7,303	8,336	7,412	2,137
2007	1,277	5,824	1,814	10,730	10,561	15,605	11,868	10,730	3,092
2008	1,286	3,512	2,212	8,374	8,755	11,497	9,894	8,374	2,650
2009	1,285	3,050	2,062	7,455	8,262	11,161	10,527	7,455	2,343
2010	1,276	1,016	2,380	4,427	6,255	4,365	8,171	4,550	1,154
2011	1,268	749	3,714	5,794	6,738	13,107	11,820	6,275	1,812
GRAND TOTAL	17,742	204,765	58,647	314,762	315,132	318,500	305,531	313,355	49,943
								Current Balance	76,528
								Redundancy/(Def)	(32,062)

MISSOURI PETROLEUM STORAGE TANK INSURANCE FUND
All Programs
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INSURANCE LINES
SELECTED ULTIMATE LOSSES

Report Quarter	Exposure Estimate	Paid To Date	Case Reserves	INDICATED ULTIMATE LOSS Rep Dev	Rep BF	Paid Dev	Paid BF	Selected Ultimate Losses	Gross IBNR	Exposure Ratio
1993	0	97	(0)	109	109	116	116	109	12	0.0%
1994	0	3,187	567	4,149	4,149	3,569	3,569	4,062	307	0.0%
1995	0	3,618	325	4,375	4,375	4,177	4,177	4,327	384	0.0%
1996	0	6,059	773	7,934	7,934	7,396	7,396	7,907	1,074	0.0%
1997	0	9,095	907	11,721	11,721	11,577	11,577	11,721	1,719	0.0%
1998	1,492	7,282	1,159	10,048	10,108	9,474	9,662	10,048	1,607	673.2%
1999	1,251	12,314	2,472	17,926	16,441	16,243	14,690	17,926	3,140	1432.9%
2000	1,160	10,430	1,897	14,830	13,814	14,995	12,822	14,830	2,503	1278.7%
2001	1,162	6,898	2,151	10,245	10,596	10,614	9,469	10,245	1,196	881.9%
2002	1,225	8,119	2,227	12,884	12,069	12,868	11,149	12,884	2,538	1052.0%
2003	1,225	5,966	2,305	10,678	10,199	10,311	9,260	10,678	2,406	871.7%
2004	1,252	6,691	1,914	11,383	10,708	13,020	10,444	11,383	2,779	908.9%
2005	1,285	4,451	1,897	8,623	8,636	9,143	8,624	8,623	2,275	670.8%
2006	1,297	2,909	1,861	6,803	7,429	6,609	7,642	6,803	2,033	524.6%
2007	1,277	5,245	1,380	9,510	9,341	14,043	10,305	9,510	2,884	744.9%
2008	1,286	3,139	2,026	7,696	8,077	10,311	8,708	7,696	2,531	598.3%
2009	1,285	2,560	1,654	6,368	7,174	9,242	8,608	6,368	2,154	495.6%
2010	1,276	891	1,460	3,235	5,064	3,603	7,409	3,358	1,007	263.1%
2011	1,268	629	2,835	4,783	5,726	9,409	8,122	5,213	1,749	411.2%
GRAND TOTAL	17,742	99,580	29,810	163,301	163,671	176,721	163,752	163,691	34,300	922.6%

MISSOURI PETROLEUM STORAGE TANK INSURANCE FUND
ALL REMEDIAL SUMMARY
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ALL REMEDIAL LINES
SELECTED ULTIMATE LOSSES

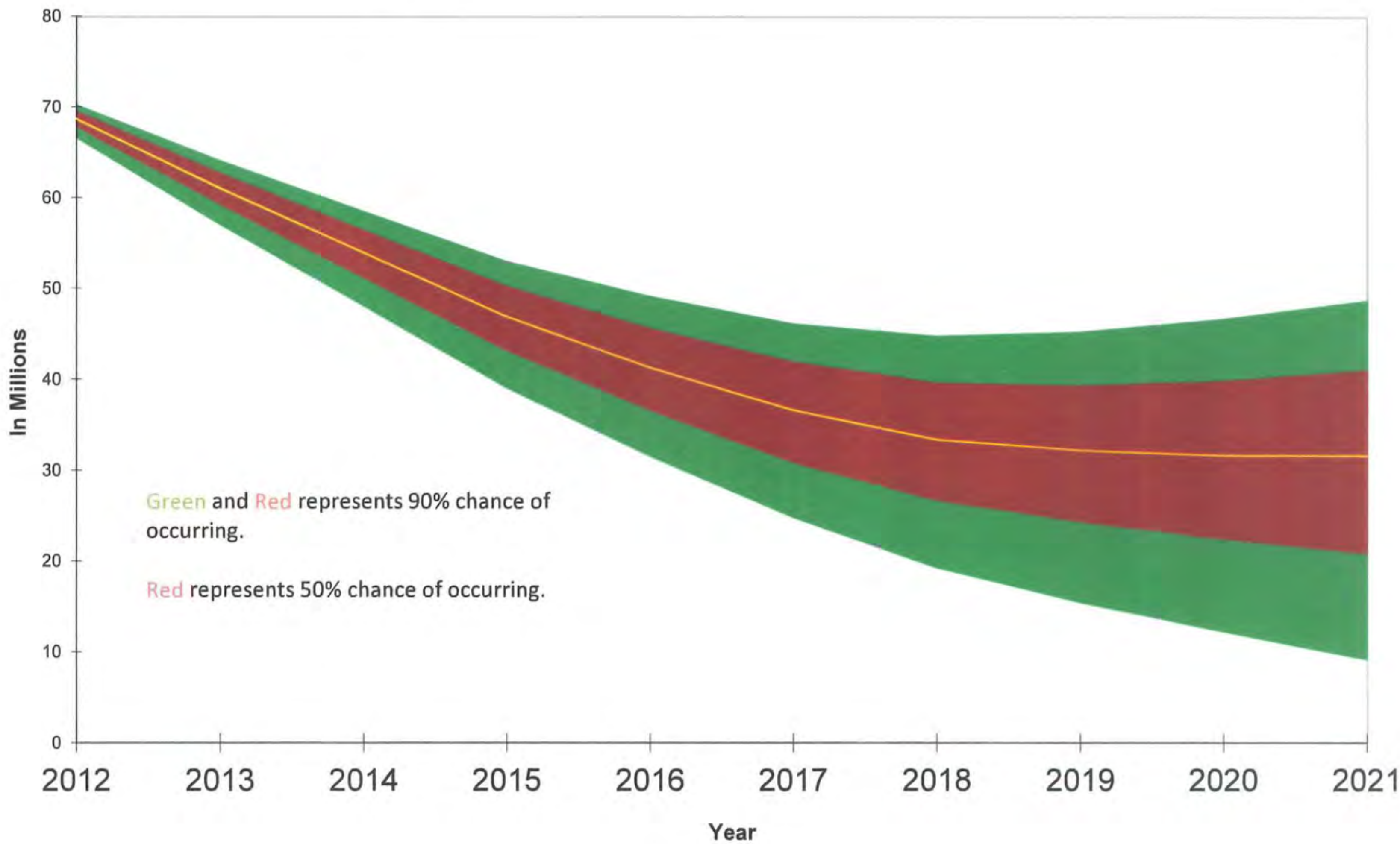
Report Quarter	Paid To Date	Case Reserves	INDICATED ULTIMATE LOSS Rep Dev	INDICATED ULTIMATE LOSS Paid Dev	Selected Ultimate Losses	Gross IBNR
1993	0	(0)	0	0	0	0
1994	0	(0)	0	0	0	0
1995	217	5	246	255	248	27
1996	50,736	10,137	65,752	58,356	63,903	3,030
1997	7,314	999	9,096	8,774	9,096	782
1998	15,873	1,676	19,859	20,246	19,859	2,310
1999	7,660	1,789	10,984	10,517	10,984	1,534
2000	12,914	4,540	20,893	18,663	20,893	3,438
2001	2,241	2,300	5,528	3,443	5,528	988
2002	2,035	1,412	4,195	3,313	4,195	748
2003	915	667	2,046	1,629	2,046	465
2004	1,797	926	3,573	3,571	3,573	850
2005	1,506	1,342	3,492	3,191	3,492	643
2006	289	216	609	694	609	104
2007	579	434	1,220	1,563	1,220	207
2008	373	186	677	1,186	677	119
2009	490	408	1,087	1,919	1,087	189
2010	125	920	1,192	762	1,192	146
2011	120	879	1,012	3,698	1,062	63
GRAND TOTAL	105,184	28,837	151,461	141,779	149,664	15,643

MISSOURI PETROLEUM STORAGE TANK INSURANCE FUND
FISCAL YEAR PROJECTIONS
PROJECTION

	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
Annual Revenues										
Transport Load Fees	$11,450,000	11,450,000	11,450,000	11,450,000	11,450,000	11,450,000	11,450,000	11,450,000	11,450,000	11,450,000
$100 Initial tank fees	$45,000	$45,000	$45,000	$32,500	$32,500	$20,000	$20,000	$20,000	$20,000	$20,000
UST Participation Fees	$952,400	$952,400	$952,400	$952,400	$952,400	$952,400	$952,400	$952,400	$952,400	$952,400
AST Participation Fees	$307,257	$313,900	$358,900	$381,400	$381,400	$381,400	$381,400	$381,400	$381,400	$381,400
Interest Income	$382,641	$514,245	$608,145	$669,697	$928,240	$813,870	$718,600	$816,205	$779,701	$759,093
Total Revenues	$13,137,298	$13,275,545	$13,414,445	$13,485,997	$13,744,540	$13,617,670	$13,522,400	$13,620,005	$13,583,501	$13,562,893
Annual Expenditures										
Administrative Expenses:										
Third Party Administrative Expenses	$3,237,750	$3,237,750	$3,269,630	$3,301,500	$3,136,425	$2,979,604	$2,830,624	$2,830,624	$2,830,624	$2,830,624
Section 319.107 Expenses	$15,450	$15,914	$16,391	$16,883	$17,389	$17,911	$18,448	$19,001	$19,571	$20,158
Inspections	$315,000	$330,000	$335,000	$340,000	$350,200	$360,706	$371,527	$382,673	$394,153	$394,154
Training & Loss Prevention Services	$41,200	$42,436	$43,709	$45,020	$46,371	$47,762	$49,195	$50,671	$52,191	$53,756
Other Professional Expenses	$113,700	$95,481	$119,345	$101,296	$125,335	$107,465	$131,689	$114,009	$138,430	$120,952
Legal Expenses	$77,250	$79,568	$81,955	$84,414	$86,946	$89,555	$92,241	$95,008	$97,858	$100,794
Department of Revenue	$40,949	$41,768	$42,603	$43,455	$43,455	$43,455	$43,455	$43,455	$43,455	$43,456
Attorney General's Office	$42,543	$43,394	$44,262	$45,147	$42,890	$40,745	$38,708	$38,709	$38,709	$38,710
PSTIF Board/Staff	$190,000	$190,000	$190,000	$190,000	$190,000	$190,000	$190,000	$190,000	$190,000	$190,000
Department of Natural Resources	$1,227,987	$1,227,987	$1,227,987	$1,227,987	$1,166,588	$1,108,258	$1,052,845	$1,052,845	$1,052,845	$1,052,846
Total Administrative Expenses	$5,301,829	$5,304,297	$5,370,882	$5,395,702	$5,205,599	$4,985,461	$4,818,733	$4,816,995	$4,857,837	$4,845,448
State Government Expenses:	$160,931	$165,759	$170,732	$175,854	$181,130	$186,564	$192,161	$197,926	$203,863	$209,978
Claim Payments:										
UST Insurance Claims - Release	$1,120,277	$1,249,895	$1,242,301	$1,130,945	$1,064,936	$1,092,020	$1,138,525	$1,186,415	$1,213,386	$1,285,468
UST Insurance Claims - Other	$2,444,341	$2,437,881	$2,189,863	$2,083,846	$1,981,369	$1,896,517	$1,800,978	$1,586,975	$1,551,467	$1,393,347
UST Insurance Claims - Closure	$4,342,918	$4,201,186	$4,311,607	$4,278,046	$4,140,551	$3,982,169	$3,423,715	$3,273,639	$3,308,842	$3,240,556
UST Remedial Claims	$6,101,680	$5,858,427	$5,353,730	$5,420,232	$4,619,157	$3,881,778	$3,092,610	$2,089,087	$1,628,704	$1,329,167
AST Insurance Claims	$971,699	$1,029,525	$1,191,735	$1,335,520	$1,410,804	$1,486,908	$1,549,607	$1,544,596	$1,448,540	$1,434,140
AST Remedial Claims	$718,635	$842,564	$883,023	$890,154	$916,058	$922,764	$835,247	$424,964	$232,702	$189,093
Subrogation	($62,798)	($62,476)	($60,689)	($60,555)	($56,532)	($53,049)	($47,353)	($40,423)	($37,535)	($35,467)
Total Claim Payments	$15,636,750	$15,557,000	$15,111,570	$15,078,188	$14,076,345	$13,209,108	$11,793,318	$10,065,253	$9,346,105	$8,836,284
Total Expenditures	$21,099,510	$21,027,056	$20,653,183	$20,649,744	$19,463,074	$18,381,133	$16,804,212	$15,080,174	$14,407,805	$13,891,710
Excess Revenue (Expenditures)	($7,962,212)	($7,751,511)	($7,238,738)	($7,163,747)	($5,718,534)	($4,763,464)	($3,281,812)	($1,460,168)	($824,304)	($328,817)
Cash balance @ 7-1-2011	$76,528,224									
Projected from 2009 Actuarial Report	$75,873,070									

	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
Funds Available at Year End	$68,566,012	$60,814,501	$53,575,763	$46,412,016	$40,693,482	$35,930,018	$32,648,207	$31,188,038	$30,363,734	$30,034,917
Prior Study	69,959,943	63,372,975	56,073,063	51,203,275	46,249,362	41,705,669	37,544,515	34,273,447		
Interest Rate	0.50%	0.75%	1.00%	1.25%	2.00%	2.00%	2.00%	2.50%	2.50%	2.50%
Annual Interest Income	$342,830	$456,109	$535,758	$580,150	$813,870	$718,600	$652,964	$779,701	$759,093	$750,873
Loss Reserve @ Year-End	99,138,305	90,863,446	83,564,893	76,755,031	70,992,680	66,142,901	62,756,660	61,147,697	60,303,253	60,013,373
Equity at Year-End	(30,572,294)	(30,048,946)	(29,989,131)	(30,343,016)	(30,299,198)	(30,212,883)	(30,108,454)	(29,959,658)	(29,939,519)	(29,978,456)

Range of Fund Balances over Time



Range of Future Equity of the Fund